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Journal of the Society of Arts.

FRIDAY, JULY 13, 1855.

EXAMINATION OF CLASSES IN INSTITUTES.

The following is the Declaration referred to by the Conference, and in respect of which the Resolution below was unanimously passed:—

DECLARATION.

"We, the undersigned, having considered the circular letter of the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, dated March, 1854, and the plan therein set forth for examining and granting certificates to the students of classes for adult instruction in the Literary and Scientific Institutions, Mechanics' Institutes, Athenæums, and other similar bodies in union with the said Society, do hereby declare that we desire to promote the success of the said plan, and are prepared to regard as testimonials worthy of credit such certificates as may be awarded in conformity thereto."

RESOLUTION OF CONFERENCE.

"Resolved,—That the Institutes, under the direction and with the aid of the Society, be requested to procure influential signatures to the Declaration."

The circular letter or memorandum referred to in the Declaration, will be found at length in the Journal for November 3, 1854, and copies may be had for distribution on application to the Secretary, to whom it is requested that a list of any signatures obtained may be sent.

THE TRADE MUSEUM OF ANIMAL PRODUCTS AND MANUFACTURES—SOCIETY OF ARTS, LONDON.

(From the *Scotsman*.)

When the glory and greatness of the first Crystal Palace were about to pass away, it was wisely resolved that an effort should be made to establish a permanent exhibition of useful products, which might perpetuate the utilitarian, if it could not preserve the æsthetical, attractions of the wondrous building. The Royal Commissioners of the Great Exhibition of 1851 accordingly acquired the possession of many of the objects of interest displayed in the Crystal Palace, and many of the exhibitors liberally contributed either the original specimens, or duplicates of these, as materials for the inauguration of the permanent collection. It was resolved to style this the Trade Museum (a title far from significant or well-chosen, as *Punch* has taken care to tell the name-givers and the public), and to make it a "collection in illustration of the productions, industrial resources, manufactures, and commerce of all countries."

Various circumstances have hitherto prevented this idea from being carried out as it was expected to have been; but the Society of Arts, of London, with the sanction and co-operation of the Royal Commissioners of the Great Exhibition, have this summer made a beginning, by opening an exhibition in the model-room of the society in question, of samples of animal produce and manufactures.

Animal products in their raw form, and in many of their stages of manufacture, are much less attractive objects than the raw materials of the vegetable and mineral kingdoms. In the latter, indeed, the raw material is not seldom more beautiful than the most elaborate objects which human skill can construct from it, whilst the products of this material are often beautiful also. But from the raw hide, for example, onwards through its

cleansing, tanning, currying, blacking, cutting, and sewing, till it yields several pairs of thick-soled shoes, it is not very easy to awaken an unprofessional interest in leather; unless, perhaps, when, richly dyed and gilt and tooled, it appears as the morocco binding of some rare folio, dear to bibliomaniacs. The same may be said of bones, bristles, horse-hair, fats, and oils, not to speak of refuse matters; and it is only silk, fur, wax, and shells, which would gratefully attract the eyes of general visitors to the Animal Trade Museum.

The Society of Arts, however, and the Royal Commissioners, had a valid reason for selecting animal rather than vegetable or mineral products for their present exhibition. The Museum at Kew Gardens, collected under the auspices of Sir William Hooker, contains a splendid collection of economic botanical specimens; and the Museum of Practical Geology at Jermyn street, Piccadilly, is equally rich in illustrations of the economic applications of geology and mineralogy. Kew and Jermyn-street thus form two-thirds of what a perfect Trade Museum should be; and the present temporary exhibition at the Society of Arts' Rooms, John-street, Adelphi, represents the nucleus of the third essential component of such a museum. It will very much depend upon the interest which the public manifests in the Adelphi Exhibition whether it is made permanent or not as part of a general Trade Museum. The admission is free; but the Exhibition will continue open for only a week or two longer, and it competes, at a formidable disadvantage, with the attractions of Kew and Jermyn-street, the splendours of Sydenham, and the Great Exhibition at Paris; nor are the warlike sympathies and political discontents of the day at all favourable to the interests of peaceful museums. But those interested in economics, who visit London, will find it worth their while to spend an hour in the Adelphi collection. It has been brought together with much labour and care, chiefly by Professor Solly, who has bestowed a large amount of attention on the subject of Trade Museums. Some two years have been spent in collecting the specimens shown, in addition to many more which there is not room to exhibit. They are arranged on a three-fold principle, carried out systematically by Mr. Solly, and to this effect:—1. A Trade Museum should contain samples of the productions, both raw and manufactured, of all parts of the world, such as leather, wool, silk, woods, gums, oils, dyestuffs, drugs, ores, and the like, so that a visitor could at once compare the silk or wool, for example, of France, Russia, Sweden, Italy, or England, with that of Canada, the United States, Persia, China, the East Indies, South Africa, or New South Wales. 2. There should be illustrations in such a Museum of all manufactures, from the collection or raising of the raw produce, through every stage or operation to which it is subjected, down to the most finished products. 3. The Museum should show progress, by exhibiting raw and manufactured articles of known age for the purpose of comparison with those of the present time, so as to illustrate the history of improvements, and save ingenious men from wasting their time in inventing as novel what has long ago been invented, and perhaps found insufficient, and thrown aside. The Museum is thus to some extent historical, but eschews being antiquarian.

One of the most complete sets of specimens thus arranged is the wool series. It begins with several entire fleeces, skulls, and portraits of important breeds. These are followed by wools in tufts, locks, and parcels; by illustrations of carding, combing, scouring, dyeing, weaving, &c.; by samples of alpaca and mohair fabrics, and of all the tissues into which wool enters as a component, the series ending with the applications of shoddy and "devil's dust" to the manufacture of pilot coats (!) and wall papers.

In the silk series, we commence in a similar way with the silk-worm's eggs, caterpillar, cocoon, and moth. Silk-moths of various species, and from different parts of

the world, succeed to these; and then the ordinary cocoons from all the countries where silk is produced, which in their turn are followed by samples of raw and manufactured, dyed, woven, and figured silks; the historical element being represented by specimens of fabrics worn in the days of our grandmothers, among which is one breadth of a gown once the property of the redoubted Sarah Duchess of Marlborough.

The Museum is necessarily utilitarian in its character and aspect, but its arrangers have been careful to relieve it, where they could, of too sombre an air. The bone series includes some splendid skulls, horns, and tusks, and many beautiful ivory carvings. Most ladies would linger with pleasure over the fur series, and compare with interest the ermine tippet worn by a Peeress at George III.'s coronation, with those which were the fashion when Queen Victoria was crowned. Under feathers, there is a brilliant show of fishing flies; under skins, occur some fine examples of bookbinding, and a curious series of illustrations displaying the various stages of the gold-beater's art. Even under refuse matters, a group of magnificent lemon-coloured crystals will be found, the basis of some of our most splendid pigments.

No intelligent person can fail to find an hour spent in the Animal Trade Museum a source of instruction and pleasure. It may also interest many, as showing one of the great classes of products which will be collected in the Industrial Museum of Scotland, which is still, but will not long be, in its cradle.

Home Correspondence.

UTILIZATION OF IRON SLAGS.*

SIR,—Permit me a few remarks on the patent process of Dr. Smith, of Philadelphia, referred to in Mr. Davison's letter;† it is a subject to which for three years I have given some attention. Early in 1852 I was consulted by Mr. Elliott, of Blisworth, on a patent taken by him in 1850 for the same purpose, specimens of the manufactured produce having been exhibited in the Hyde Park Exposition of 1851. On perusing the specification, I suggested some improvements, and Mr. Hindmarsh and Mr. Webster coinciding in my opinion, a second patent was secured, and this patent, dated prior to Dr. Smith's, comprises in the specification the annealing process and every other important claim, clearly subjecting any minor manipulations to a license from the prior patentee. But the field is most extensive, the objects most important, the time required to bring operations of such magnitude into general use is great, so that united efforts are most desirable, and I am confident the holders of Mr. Elliott's patents will be disposed to do everything in their power to promote and assist Dr. Smith's course of action. As the matter proceeds, there will, more than probably, be great scope for securing by patent further minor improvements of detail, but all these must remain subsidiary to the first general claim for converting the iron slags into a compact and durable material by the process of annealing. The value of annealing in the ordinary glass manufacture is well known, but it has a still higher importance to those who are well acquainted with the nature and behaviour of the slags or cinder of smelting furnaces. These require a still further degree of annealing, amounting, in some cases, to devitrification, to ensure an available and marketable product. The igneous solution of the earths by an alkali, cements common glass into a homogeneous compound, in which the great variation of expansive and contractile capacity belonging to the earths is comparatively amalgamated. Alumina shrinks under intense

heat, and remains contracted when cooled, a property on which it is well known that Wedgwood founded his pyrometer. Silica, on the contrary, expands under heat and re-contracts on cooling. I have seen a cupola blast furnace built with highly-silicated bricks, extend itself upwards from four to six inches, or more than one-tenth of an inch per foot while under blast, and sink to its original level when cold. It is the action of these opposite qualities which gives such an *apparent* brittleness to the slags of the iron smelting furnace. The silica, which is their principal constituent, united with lime, which is less variable either way, rapidly contracts as the outer surface cools, and shells off from the hot and still expanded mass; fragment after fragment falls away, and if there be much lime interspersed in the bulk without fusion, the interior will fall to powder when cooling. But both the outer fragments and the internal mass, when once cold and contracted, are anything but a brittle substance; the hardness is great, the vitrid texture resists the action of water, and from these combined qualities such slags have long been in request, as excelling all species of rock, for the purposes of road making. The rationale of the effect of annealing in addition to slow cooling, is well known. Crystallisation or solidification, whether from liquid or igneous solutions, is more complete and solid the more slowly the process proceeds. Very large crystals are obtained by slow evaporation, and there is abundant evidence of a similar effect in producing a massive and solid structure by the slow and uniform cooling of vitreous fluids. Thin masses of slag, drawn out into twisted and other ornamental shapes, have always been a favourite decoration of the furnace-man's cottage. These thin masses, cooling throughout at once, do not lose their tenacity, and on the other hand, the last portions of slag which run out with the iron, resting in bulk on the surface of a body holding so much more specific heat, cool far more slowly than their own constitution would permit, and by this species of annealing develop a large and crystalline arrangement in their fracture. Mr. Elliott proposed, by processes of annealing duly applied, to convert the several million tons of iron slag produced yearly in this country into tiles, draining and sewage pipes, paving and other bricks, and architectural mouldings of every description. It is as long since as November, 1853, that I called public attention, by a letter in the *Mining Journal*, to the vast economical promise of such a manufacture. For all underground works, cemeteries, drains or sewers, such bricks and pipes would be invaluable, from the absence of porosity, and impossibility of decomposition. Under some fairly-grounded views, but in which I did not entirely coincide, the first operations of the company holding Mr. Elliott's patents were directed towards establishing, under his first patent, the manufacture of a certain proportion of these valuable articles, in combination with the ordinary brick manufacture. Reasons of convenience dictated these preliminary experiments before encountering the difficulty referred to in the discussion on Professor Wilson's paper,* of persuading iron masters, engrossed in expensive and extensive operations, to disturb their ordinary routine by any course of experiment. But it is obvious the safest, widest, and readiest field for commencement lies in the manipulation of their slags, already fused without cost, and thrown away to waste, at an expense in labour and land which would go far to cover the cost of labour in moulding. The ultimate success of the manufacture will depend on the cheapness with which effectual annealing can be realised, and on the amount of labour required to utilise the whole daily produce of the smelting furnaces, so that articles of not only partial use and high price may be brought into the market, but a large bulk of produce of general utility. In those ornamental fabrics to which Dr. Smith seems peculiarly to have addressed his attention, the cost of polishing will probably form an important item. The substance is much harder than ordinary glass, combined

* It will be seen by the date at the foot of this letter, that it was written before Dr. Smith's paper was read to the Society, and which will be found printed at page 335.

† *Vide ante*, page 307.

* *Vide ante*, page 247.

with a large bulk of alkali; it is harder than porphyry, serpentine, and other ornamental siliceous rocks containing water of crystallisation, and still harder than marble with its copious constituent of carbonic acid. The same cause which gives hardness for decorative uses, gives greater weight for common uses, increasing the charge of transport. The density is double that of ordinary brick or tile, but to compensate this inconvenience, the greater strength, when properly annealed, will permit of a thinner substance for roofing or draining; and for building the weight is diminished to any degree by indefinitely varied modes of piercing, which fall under the claim of Mr. Elliott's specifications. Numerous avocations have prevented me from taking any active part in superintending the working details of applying these patents, which, considering the wide and important prospects they indicate, I should have been most desirous to assist in; but for those who can devote their whole time and energies to push the matter to a conclusion, there promises a scope for the united and hearty action of not two only, but even of ten times two, patentees; and I trust that all interested will join in earnest in pressing forward a comprehensive result to their mutual advantage in so important a field.

I am, sir, your obedient servant,

DAVID MUSHET.

March 20th, 1855.

INTERNATIONAL DECIMAL COINAGE, WEIGHTS AND MEASURES.

SIR,—It appears from the discussion recently held in your Society in reference to the approaching Congress at Paris, the object of which will be the consideration of an International Code of Mercantile Law, that the adoption of a general system of measures, weights, and coins, is considered as included among the great aims of that Congress. (See *Journal* for February 9th, p. 190, 192, 196.) Your Society, I believe, took an active part in the promotion of this object at an early period of its history, and I rejoice that the subject was resumed by its Council, when they resolved to present to the Lords Commissioners of Her Majesty's Treasury that admirable memorial which is published in your *Journal* for March 25th, 1853.

The Council of your Society having declared its opinion in favour of a uniform system of measures, weights, and coins for all nations, I beg to offer a few remarks with a view to the introduction of this subject at the Congress in Paris, to which I have alluded.

As in every separate country the adoption of any particular coinage, as well as of any particular set of weights and measures, is determined by the law of the land, so the adoption of any international metrological or monetary system must depend on laws, upon which the nations in union agree. Commercial law, therefore, seems to include laws on the subject of measures, weights, and coins among its special objects. It is true that in numerous instances an accordance in the employment of the same measures, weights, and coins by different nations has been attained even independently of law. It appears to have resulted from a common perception of the advantages to be derived from such agreement. But there can be no doubt, that without any stronger and more permanent bond, this agreement is always in danger of being broken, and there are, moreover, numerous circumstances and various arrangements, which might be determined by law so as to introduce great improvements. If any two countries, such, for instance, as France and Belgium, agree to a very great extent, even without being bound by treaty, or by any sanction beyond a prevailing sense of justice or of mutual advantage, additional securities and still greater exactness might be obtained by common regulations.

Suppose, then, we were to send delegates to Paris to confer upon the subject at a general Congress, what course should we adopt?

Mr. Decimus Maslen, one of the earliest and ablest advocates of what is called the Pound and Mil Scheme, in his "Decimal System of Money, Weights, &c., London, 1841," proposes a *concordat* among the nations of Europe for this purpose, but he assumes that the scheme, which he espouses, being based upon the pound sterling, is so indisputably superior to every other, that if different nations are invited to join in a particular plan, this and no other must be the method proposed. His conclusion is in the following words:—

"I should hope that there can be but one opinion as to its usefulness, its simplicity, its facility for each country, and its perfectness, and therefore, if foreign nations cannot see their own interest in adopting it, if their jealousy of England is such that it blinds them to the advantages of a universal and uniform monetary system, they must even jog on in the old rotten road, in which they have stumbled along for so many centuries from the dark ages of ignorance, prejudice, superstition, and error."

Thus does the sanguine advocate of a new system, or, in other words, of a coinage for the most part never tried, and existing only in imagination, regard it as certain to succeed universally because it is based on the English pound; thus does he assume, that nothing but prejudice and barbarism can oppose the acceptance of so great a boon. The Mandarins and bonzes of China would put forth exactly the same pretensions on behalf of their money, and perhaps with better reasons.

Others may commit an error the very opposite of Mr. Maslen's by proposing to go to the Congress with their minds like a sheet of white paper, quite unprejudiced, ready to inquire and be informed, and to receive any impression according to the light of truth. It should be remembered, that we go to meet delegates from other countries, with whom the subject is not new, and that if we go to Paris to learn our A, B, C, we can expect nothing better than a cool and polite indifference to our childish ignorance from those who have long been familiar with the question, both in its general aspects and in all its details. We must not suppose, that we are entering upon new ground. If with seeming candour and generosity we propose, that all other nations should unite with the English in investigating the best principles and methods of procedure with a view to their universal adoption, we shall be told, that we are only proposing what has been done long ago; that the French Government, before the great Revolution, took steps to engage the co-operation of other countries; that they were joined by some of those countries; that the system then agreed upon has, after overcoming a multitude of obstacles, been firmly established; that it has been hitherto as successful as could, under such adverse circumstances, have been anticipated; that it is highly approved and admired by those who have attended to it, and seen it in operation; and that there is now a very encouraging prospect of its further extension.

To me it appears manifest that in any continental congress upon this subject, the discussion must be to a great extent, and perhaps mainly, directed to the consideration of the *Système Métrique*. This is the only system of measures, weights, and coins, which is founded upon exact and philosophical principles; which, in consequence of being formed upon no local or partial basis, but designed for mankind at large, and offered to the acceptance of all nations, has a just claim to impartial attention; and which cannot be altogether and at once abandoned by those who have decided upon its adoption after the most careful inquiry, and who have found it in general well adapted to their requirements. No one can be a fit delegate, who is ignorant of this system, or decidedly hostile to it. He ought to be prepared to give his general assent to the merits of those by whose labours and investigations it has been brought to maturity, although nothing need prevent him from proposing improvements not at variance with its main principles.

Notwithstanding its general excellence, there are probably circumstances of detail in which the *Système Métrique* may be improved, more especially when regarded as a system for universal adoption. By way of an example, I may mention that the corresponding French and Belgian coins are said not to have contained at all times the same quantity of alloy. A convention of states might decree that all their coins of the same metal and denomination should contain the same proportion of alloy, be of the same size and weight, and differ only in their image and superscription. Another question of no less importance would be how to obviate the loss and embarrassment which frequently arise from changes in the value of the precious metals. Silver being the standard, and the franc the measure of value, gold would vary in price on the usual principles of demand and supply, and this circumstance would make it necessary to vary from time to time the quantity of gold in coins of the same denomination. This would be done in the most satisfactory and efficient way by a congress or meeting of delegates, held at stated times for this and similar purposes. Nothing can be conceived better adapted to the wants of the most advanced civilisation than an international decimal coinage, regulated by common consent, and accompanied by a corresponding international system of weights and measures. It would obviate the tendency to superfluity in some coins, and to deficiency in others; it would annihilate the delay and embarrassment incurred in changing the coins of one country into those of another; and it would extend to nations the same conveniences which have now been enjoyed for a long period of time by provinces.

In confirmation of these remarks I would refer to the letter of the Vienna correspondent of the *Daily News* in the number of that journal for February the 17th. The writer gives an account of the conference held at Vienna by representatives from the principal states of Germany, with a view to the adoption of a common coinage. Austria proposed a new coin of gold, and the other states one of silver, this metal being preferred as less liable to great fluctuations. The writer concludes his account by saying:—"It is generally believed that the only way is to make concessions on all sides, throw up all existing coins, and boldly introduce the most perfect system, theoretically and practically, known in the world, the French decimal system."

I notice a fact mentioned by Mr. Jacob Franklin, in his essay lately read before your Society (see *Journal of the Society of Arts*, Feb. 16th, page 219), as tending to another most important assimilation. He observes that the German Zollverein has adopted a *zoll-centner* or *cwt.* equal to 100 half-kilogrammes. We might do the same by a very small reduction of—

Our ton = 1016 kilogrammes.
Our sack = 101·6 ditto.
Our cwt. = 50·8 ditto.

In all our great mercantile transactions, as well as in weighing all bulky articles for domestic use, such as stone, gravel, ores, iron, coals, potatoes, sugar, cotton, wool, tallow, timber, &c., and in all calculations connected with shipping and engineering, we should, by a slight adjustment, to wit, by striking off sixteen parts in a thousand, come into exact accordance with the whole of Western Continental Europe; for the French weights, as I have reason to believe, are employed in Holland and Denmark, as well as in all those countries which use the French monetary system, and the introduction of them has been decreed in Spain and Portugal.

I have thus endeavoured to explain the views and motives with which, as it appears to me, delegates from this country might attend the approaching congress. To show that we are willing to meet our neighbours upon common ground, instead of standing aloof from them, as we have hitherto done, would of itself have a salutary influence, and would tend to raise our national character. The diffusion of information respecting the progress and

extent of the *Système Métrique*, the difficulties it has encountered, its allowed benefits and its alleged defects, would be very important. Indeed this appears to me of so much moment, that I would suggest the offering of prizes for the best historical memoirs on the origin and introduction of the system, since we are greatly in want of such information, and a well-compiled narrative, relating facts and recording arguments, would be exceedingly valuable. Whether we might obtain any immediate practical result or not, it is certain that fair discussion, friendly intercourse, and candid and impartial consideration of the subject, as one combining the interests of commerce with those of science and philanthropy, would do honour to the authors and members of the delegation, and conciliate respect and confidence towards the nation which sent it forth.

That your ancient and powerful Society may never renounce or forget its high office of calling science to the aid of commerce as well as of manufactures and the arts, is the sincere wish of,

Sir,

Your most obedient servant,
JAMES YATES.

Lauderdale-house, Highgate, March 3, 1855.

P.S. June 26th. Notwithstanding the result of Mr. Brown's motion in the House of Commons, on the 12th instant, and the little support there given to Mr. J. B. Smith's amendment, the intention of holding a general congress this year in Paris for the consideration of international measures, weights, and coins, is by no means abandoned. The celebrated Michael Chevalier, perhaps the highest authority in Europe on this subject, in letters which I have recently received from him, expresses the warmest interest in the movement now commencing both here and in the United States of North America; and in particular he expresses his high admiration of the extensive views of Mr. J. B. Smith, observing that a reform confined to money would be insignificant, and that it ought to embrace weights and measures in order to cement the harmony and union of civilised nations, and he concludes, "Honour be to him [Mr. Smith] for his effort; success will one day be his reward." J. Y.

LIFE BOATS.

13, Brompton-row, June 4th, 1855.

SIR,—It was with great regret I observed that the Society had not been able to find an opportunity for the reading and discussion of Mr. Henderson's excellent paper on Life-boats. It is a subject in which I take much interest, and I wish to offer a few observations upon it, if you should think them worth insertion in the *Journal of the Society*.

I would first advert to an alleged source of danger to life-boat crews, which I think is imaginary—that of the boat turning *end over end*. This has been, I think, on five occasions alleged by life-boat crews as the cause of the loss of their boats.

Now, it is obviously natural for boatmen to wish to assign for such an accident some cause beyond their own control, rather than to attribute it to their own want of nerve or of seamanship. This observation does not necessarily charge the men with falsehood. No one who ever has been upset in a boat in rough weather will be unaware of how entirely impossible it is for men who are knocking about, and bruising themselves against the boat, or swallowing salt water by bucketsful, to get any distinct idea of what exactly does happen, and it is quite natural for men to argue from the extraordinary nature of their sensations to an extraordinary cause, for then, especially when the ordinary solution of the difficulty might impute to them a want of skill or vigilance, of which they would be unwilling to accuse themselves.

I do not believe any boat will capsize end over end. Let any person who does, take a model down to Brighton or Ramsgate, and try whether he can get it capsized in that way. The way in which a boat, carefully steered, upsets in a sea-way is from a great wave striking her hard

enough to disconcert the crew; she then slews round to the next wave and goes over. I have seen this happen frequently.

On the other hand, I have been caught by a topping sea in a dingy, eleven feet long. I pulled straight at it, and, instead of turning end over end, I went through the crest of the wave, half-filling my boat, and getting knocked into the sternsheets. Of course I knew what the next wave would do; so instead of waiting for it, I dived right into it, and helped my boat ashore bottom up. Now, if anything could turn end over end, I think it is a dingy eleven feet long.

The circumstances attending the upset of the Apple-dore life-boat seem evidently to have been mis-stated by the crew. The Tynemouth case seems more doubtful, but I do not think it is clearly established, even in this case, that she went right over in the line of her keel. At any rate, however, this misfortune was principally owing to a bad arrangement for the water-ballast, and to the men not being properly secured.

In the whole discussion on life-boats, one question seems to have been almost entirely neglected, and that is the selection of different boats for different places and services. The boat that is to rescue a collier's crew among the sands of our eastern seaboard, and the one that is to land some score of emigrants at every trip upon the open shores of the channel, are two things as essentially different as the dog-cart that takes you to the meet, and a Hampton Court van. To expect a boat to be invented which shall perform all services, on all shores, and under all circumstances, is exactly as absurd as to expect to have a carriage which shall be fit to carry the family to church on Sundays, pigs to market on Saturdays, and farm produce to the homestead the other days of the week. This is nothing more than every boatman knows, but the public does not know it. The public never does know these things until they are forced upon its notice, and it is not by inventors that it is ever warned not to expect too much.

The Duke of Northumberland's Committee has done something to keep up this expectation of a paragon life-boat by its offer of one prize to the one boat which should come nearest perfection. I do not disparage his Grace's noble offer, or its invaluable results. It is true that it has not given us what could not exist, but it has done two things past all price. In the first place, it has given us a good average of the best of the various inventions, so that we have an excellent boat for general purposes; and secondly, it has brought before the public an immense mass of useful ideas, which may be turned to account wherever any special service is required.

Capt. Washington and his coadjutors have so much more experience than myself, that I have some diffidence in suggesting whether they may not have given too much value to the *self-righting* quality. This quality can only be gained by the sacrifice to some extent of several other virtues. It demands high air-cases, which catch the wind,—a heavy keel, which increases the draught, and makes the boat labour, and even then it cannot right itself if its crew are lashed to their seats. It would be very useful to have a return, unencumbered with other matter, of the results of life-boat upsets, showing the proportion of crew and passengers of the life-boat saved. (1) Where the boat did actually right itself, (2) where it did not. It is so difficult to return to a boat, when once tumbled out of it so roughly, that I doubt whether the two proportions would be very materially different.

With reference to life-boats partaking of the character of the raft, or catamaran, I venture to bring under notice an invention of Mr. H. Augustus Severn, of the Royal Australian Mint, which seems to combine most, if not all, the advantages of Richardson's, with a power of turning to windward, which Richardson's does not possess.

It is, in fact, a whale boat divided longitudinally, flat sides put to each half, and the two halves set eight or ten feet off by means of three strong beams, with diagonal

bracing. An iron or copper band passes along the top of each beam, round the outside of each half-boat, through a slot in the keel, and up the flat side to the beam again, where it is strongly secured by a slot and key, or by nuts. If it is desired, blocks may be put between the beam and the band, so as to make it a compound girder. A platform of strong rope netting, or metal lattice, is stretched between the halves, and a mast is stepped on one of the beams. Air cases and water-ballast tanks are placed at the sides, above which the rowers sit.

In a model this boat seemed everything that could be desired, as far as its sailing and seaworthy qualities were concerned. It would sail to windward through waves higher than its length, and nothing seemed to capsize it. The model has been severely tested, and a full-sized boat is now building at Sydney by the inventor.

It is evident, that in this boat the metal-centre is thrown so high, that it matters little how high it is ballasted. It is consequently well adapted for carrying large loads of cargo or passengers, and would serve well for landing or embarking horses, artillery, or cattle.

I am, sir,

Your's truly,

CHARLES W. MERRIFIELD.

THE PANOPTICON PRINCIPLE OF BUILDING FACTORIES.

SIR,—The Society of Arts have already honoured the memory of the late Sir Samuel Bentham by the insertion in its *Journal* of details of several of his improvements; and I would now solicit attention to another of them, the value of which has only of late been appreciated, and that only in the instance of one of its several applications. I allude to *Panopticons*, that is, buildings which from their mode of construction, afford a point of central observation, from which all that is going on within their walls may be inspected. Jeremy Bentham (Sir Samuel's brother), in a letter to their father, ascribes the origin of this invention to Samuel's observation at Paris, that in a public educational establishment there, an inspector perambulated the sleeping apartment of the pupils during the whole night, to observe through a glass window, whether any of the inmates of the separate chambers were stirring or misconducting themselves, but it was not till the year 1786 that Sir Samuel carried his ideas into effect. At that time, when in command of a battalion near Krichieff, he had the entire management of several of Prince Potemkin's extensive manufactories, but having literally no skilled or scientific assistant, he was compelled, as it were, to superintend the fabrics himself. To save time and trouble, he therefore devised a structure, from the centre of which he might witness all that was going on. Military operations soon called him to the South of Russia; this first Panopticon was abandoned, but in the year 1806, when on a mission from this country to Russia, and having orders to exert himself to gratify the Emperor Alexander's wishes, a Panopticon for a School of Arts was erected, under Sir Samuel's direction, at Ochta. This structure is particularly mentioned, because, having been in it myself, I can vouch that from its centre all that was going on within the building was visible, and that, although the central part was 140 feet in diameter, to which centre five rays were added, each of them 105 feet long.

In this country the Panopticon principle has hitherto been only adopted for prisons, and it is only of late years that its efficacy has been generally acknowledged. Yet it would seem that it is no less desirable for the purpose it was originally designed for, namely, a *manufactory*.

Without recurring to the effect of the "Master's Eye," it must be admitted that supervision of the several subordinates employed is no less conducive to the prosperity of a manufactory than is the overlooking of the operatives, and this effect can only be insured in a Panopticon, for it is only from a central point of observation that the many chambers of a manufactory can be at once inspected.

This in a panopticon is feasible by either its proprietor, his partner, his chief manager, or by any other person appointed to perform the important business of general inspector. In the model of a building of this nature, which Sir Samuel made for his brother Jeremy in the year 1794, the floors were so constructed, that from one point of view two separate stories were equally in sight, but such an arrangement of course requires much mathematical calculation. In that model, also, a central chamber was shown, wherein a considerable number of persons might witness not only the several operations going on, but also the habitual treatment of the prisoners. This chamber was proposed to be open to the public by night as well as by day, and for inspection of the upper floors and dormitories an inspector's chair was provided, in which he could raise himself to any height. The provision of such a chamber might be desirable in many manufactories, since it has been found that the presence of strangers is apt to disturb the assiduous attention of the operatives.

A prominent advantage of this mode of structure is, that without injury to the façade, the building may be augmented according to need. Thus a central part only may be at first constructed, and rays added to it as wanted, or the rays themselves may be from time to time lengthened.

In these days of rapid progress, and the application of *raison* to so many things, it may not be a visionary hope that the existing form of buildings will be no longer adhered to, but that in lieu, subserviency to use may be no less considered than established practice.

I am, sir, yours truly,

M. S. BENTHAM.

Holly Mount, Hampstead, June 30th, 1855.

MEN OF SCIENCE AND PATENTEES.

SIR,—At the Society's dinner at Sydenham, attended by men of all classes and pursuits—the philosopher—the man of science—two distinct phases of mind—the man of practice—the man of arts, and the man of buying and selling—Professor Owen descanted on the hardships endured by men of abstract science, producing nothing palpable wherewith to go into the great market of life, and yet the benefactors of the community, indirectly in giving rise to new arts, in which practical men find some prizes and many blanks. He himself received, he stated, £500 per annum from the College of Surgeons so long as he shall do nothing which they may consider heretical; and beyond this he has the gratuitous use of a cottage belonging to one of the royal palaces.

Sir Joseph Paxton, in commenting on this speech, alluded to the Patent Laws, and stated, pertinently enough, that out of the taxes contributed by patentees, in return for their protection in the uses of their own brains, ample funds could be given for the remuneration of the workers at abstract science.

There is great justice in this. The men of abstract science, the Daltons and Faradays, working indirectly for the public, work, and more directly for inventors, could be compensated without charity.

Much discussion on the Patent Law has appeared in your pages. The effect of the Amended Patent Law has been to make patents nominally cheaper, but really dearer, but the great evil, the costly, unnecessary, and uncertain legal process of adjudicating disputed patents is left untouched. How long shall patentees labour under this grievance?

Patents are granted on the ground that without them active-minded people will not take the trouble to invent and bring new and useful things out for the public benefit; and the patent must be for something *new*. Now, there is nothing really new under the sun; and, consequently, the patent can only have reference to something not in actual use, or not recorded. Intrinsically this question is of something not in actual use, for a neglected record is

equivalent to being not known. It is held that landed property having no legal owner for a certain number of years lapses to the actual possessor; therefore, as the patent really is granted to induce people to put things to public use, it is probable that when we are a little more enlightened, we shall hold that things which have disappeared for forty years from public use shall be considered as new things, rediscoverable, and capable of being dug up and patented as though no record of them had ever existed; and the public would clearly benefit by having attention constantly directed to the fructification of the old as well as the production of the new.

This was the opinion constantly advocated, of my revered friend, the late John Farey, and I apprehend it will be difficult to disprove. It is worthy of agitation in your pages.

I am, sir, yours faithfully,
W. BRIDGES ADAMS

July 3rd, 1855.

THE PARIS UNIVERSAL EXHIBITION.

SIR,—As I am fully aware of the interest which the Society of Arts takes in the success of the Paris Universal Exhibition, I think it advisable to send you a few lines concerning the progress of this important undertaking; indeed, it is only fair play to let you know the truth upon the subject, as the English journals have hitherto done nothing but throw cold water upon the whole concern. My information will be derived from my own personal observation at the Palais de l'Industrie during the whole of last month, as well as from a constant intercourse with several members of the Imperial Commission.

At the opening of the Exhibition the general impression was one of disappointment. Natives and foreigners, all expected that things would have been more forward, and in a better condition to receive the offerings of civilized nations. That such was not the case, became but too apparent from the unfinished aspect of the building—from the numberless bales of valuable goods strewed here and there, and from the general air of ruin and desolation prevailing everywhere. And then, what a string of grievances against the arbitrary measures of the contracting company. To think of obliging a Frenchman to pay for the pleasure of viewing the wonders of industry and the delights of the fine arts. Why, sir, the idea alone was preposterous, and could end in nothing else but a total failure of the undertaking. Such was the hue and cry set up at first by our friends and allies, which, as a matter of course, was followed in by the firm and steady battalion of all "OUR OWN CORRESPONDENTS."

Well, two months have elapsed since the beginning of the Exhibition, and how far have these gloomy expectations been realised? There is no gainsaying figures. For the last three Sundays no less than ONE HUNDRED THOUSAND persons visited the Palace, and every day of last week they numbered between twenty and twenty-five thousand, Friday excepted, on which day the price of admission is five francs; in fact, people begin to say, the English as well as others, that the Exhibition will, in point of detail, prove superior to our own in 1851. So far from being a failure, the Paris Exhibition turns out to be a signal success. How are we to account for this, as well as for the untoward circumstances which marked its beginning?

In regard to the latter question, allow me to say, sir, that the French government had undertaken a thing utterly alien to the previous habits of the nation. You are well aware that Museums and Exhibitions of every description have always been thrown open freely and gratuitously to the people. On the present occasion, however, the government entered upon the undertaking according to the English system of private speculation, and a company contracted for the building; hence the necessity of requiring a fee for admittance, and hence so much grumbling, so many complaints.

The very circumstance of entering upon this new system gave rise to difficulties of which we can hardly form an idea in our own country. These difficulties have, however, been conquered, as well as others of a more serious nature—I allude to the want of energy and decision in the persons who were placed at the head of the organising commissions. It would be invidious to speak disobligingly of those who have been lately removed from office, I shall, therefore, confine myself to the fact that since Mons. Le Play, an eminent French engineer, has been entrusted with the executive power, he has already done wonders, and to his strong impulse, fully supported by Prince Napoleon, may be attributed the progress which has marked the last and the present month.

First of all, such exhibitors as had been hitherto daily putting off the display of their goods, though everything was ready to receive them, had notice of immediate eviction in case they did not proceed to business without delay. The consequence of this measure alone has wrought miracles during the last fortnight, more particularly among the French, who were conspicuous for their inconceivable neglect and disregard of time.

2. The completion of the building, and the creation of new structures in every direction, has been pushed on, day and night, with surprising rapidity, so that at present the whole Exhibition is really accessible to the public at large. In the immense *annexe* which runs along the river, the machinery is worked by steam, so that visitors may thus witness in practice the wonderful inventions of human ingenuity. I can assure you that this forms by no means the least attractive part of the Exhibition.

3. The new director has established a most useful branch of administration in an office where a certain number of gentlemen are constantly in attendance to give information and inquire into complaints. One of them is familiar with several European languages, and I know from personal experience that he has already been of some use to several of our countrymen, as well as to the Germans and Italians.

4. Measures have been taken to facilitate free egress and ingress to all exhibitors and their workmen or attendants. At any rate, when any casual difficulty occurs, they have but to apply to the *Bureau des Réclamations*, to see it immediately solved or soothed down. Indeed, in this respect, I must candidly admit that some of their pretensions are downright extravagant, and, if not curbed, would lead to the admittance of 42,000 gratuitous visitors every day, to say nothing of the frauds practised upon the Company.

The results of the new spirit infused into the administration by M. Le Play are fully apparent in the splendid appearance the Exhibition has now assumed. Indeed, it does him the greatest credit, no less than the affability with which he receives the foreign commissioners and agents at every hour of the day. Let him be ever so busy, his door is open to them, and if they do not choose to seek for support on difficult occasions, but prefer to grumble on, it must certainly be laid to their own door.

And now, sir, let me add that our countrymen would do well to come over at once, whilst the Exhibition is still in all its freshness and beauty. The admirable workmanship of the French artists in jewellery, bronzes, porcelain, &c., is not only worth seeing for an amateur, but might furnish excellent hints and practical lessons to our own artisans. The simple inspection of such masterpieces is frequently sufficient to spur and stimulate latent genius.

And, by the bye, I am glad to inform you that measures are about to be concerted with the French railway companies, which will enable the labouring of all countries to visit the Exhibition at a cheap rate. Prince Napoleon has, I believe, taken the affair in hand, and is resolved to effect this long-wished-for melioration. This, I trust, is a piece of good news for the Society of Arts, and for the numerous Institutes in Union with it. The

laudable endeavours of the Council in this direction were checked last year by the obstacles which it had to encounter on this side of the Channel,—but I again repeat that these obstacles will be cleared away in a very short time. Thus, if the Council, or any particular members of the Society, are disposed to resume their former views on the subject, they will find their realisation far more easy than six months ago.

And now, to conclude, you may see that the Paris Universal Exhibition is anything but a failure. The French have certainly had their difficulties to contend with in the beginning, and would have acted wisely had they kept them to themselves, just as we did in 1851. After all, they have of late displayed great energy in making up for past deficiencies; just the same as our own nation, *magnis componere parva*, is now retrieving our faults and blunders in the Crimea. On that trying occasion, the French never uttered one single word of complaint against us; should we not do the same, at least, in an undertaking where neither human life nor a nation's honour are in jeopardy?

I remain, sir, yours truly,

C. F. AUDLEY.

Paris, July 8th, 1855.

THE CUSTODY OF THE SOCIETY'S TRADE COLLECTION.

SIR,—Sir Joseph Paxton, judging from his speech of to-day, is very anxious to carry all our property to Sydenham. This may be very useful for the multiplication of Sydenham shillings, and thus doubling our subscriptions for entrance to examine our own wares, but it is not a useful proposition for the Society of Arts as a body. The Society is now upwards of 100 years old. It gave birth to the Great Exhibition, and the Great Exhibition gave birth to Sydenham. In the hey-day of exultation the child disowned its father; the hundreds of thousands of pounds which the Society enabled the Great Exhibition to earn, was wholly kept away from the Society, rendered poor by its many efforts for a successful rival, and in its last effort for education it went into debt, and was denied help from the mass of wealth it had helped to create.

I can understand that our collections would be useful to Sydenham, just as a new attraction is useful to Cremorne. But we have to look at home, and not trust our property out of our own keeping. Who is to guarantee the expense of moving. Who will guarantee its safety at Sydenham from wet and damp, and “land rats, and water rats.” What, if waiting away from our own dry storage, it should happen to be placed beneath leaky glass, unrepaired during the long nights of winter, and without the means of warming and drying. This is a Society over 100 years old. The Crystal Palace is little over two. What are its funds, what are its means, what its guarantees of permanence, that we should merge our collections in it and thus deprive ourselves of the chance of creating a newer and larger habitation than we now possess. All we know is, that its shares are certainly not at a premium, that its directors have left it, and Sir Joseph Paxton is its be all and end all, who will no doubt keep it up as a very beautiful garden, hot-house, and green-house, but as certainly not as a museum, a thing not compatible with vegetation. If the courts could be sealed in glass like hermetic gardens, or were located in a dry climate in volcanic lava, their gorgeous beauty might be preserved for years, but in the atmosphere of a green-house they must finally become mere theatrical daubs, to which the scenic painter's mop will be applied from time to time, till people draw on their imaginations for the original realities. The Crystal Palace will have answered its purpose of leading people on to something better, but from the want of philosophical reflection as to the capabilities of matter, it can only be, as the boy's copy for writing by, a thing to be worn out

in the process; or it must be remodelled altogether, separated into distinct parts, and double glazed, dried, and warmed, the vegetable creation apart from the works of art. To look on that beautiful Alhambra, and to know that an insidious damp must gradually creep under it, and destroy its beauty, leaving it a mere caricature of its Moorish prototype, would be a painful sensation, and I trust that Mr. Owen Jones will case it in glass to save it. Trusting also that our property will never be placed in such a predicament,

I remain, Sir,

F.S.A.

July 3rd, 1855.

THE TRADE MUSEUM.

SIR,—I have been much gratified by a visit to that part of a Trade Museum which is now exhibiting at the rooms of the Society of Arts, and I trust that a collection so valuable and instructive will not only be enlarged and rendered permanently useful, but may also be extended to every chief town in the kingdom, so as to be available for instruction in our Mechanics' Institutes and our public or national schools. The effect which might be thus produced is really incalculable.

I will detail to you the result of such an experiment. I have been the manager of the Girls' Bishopgate-street School at York, where they enjoy the advantage of a most skilful and intelligent teacher. Having remarked the gratification which the object lessons invariably gave to the children, and the good effect which they produced upon the mind, I was led, upwards of three years ago, to commence forming a series of objects of manufacture—beginning with the raw material, and tracing every process, step by step, to its highest product. Through my own personal influence with many kind friends, this has now become an important collection, illustrating the manufacture of textile fabrics, both animal and vegetable, and containing specimens of gums, dyes, oils, spices, cereals, and many others.

The result of this real and practical teaching has been most beneficial, and is evidenced by the increased intelligence of the children, and the eagerness with which they pursue useful knowledge; in fact, the tone of the school is such, that education ceases to be a task, and is rendered pleasing and attractive.

The advantages which have accrued to this school, and the deep interest which I take in the education of the poor, induce me to bring the subject before you. I would propose that every public school should possess a series of objects illustrative of the progress of the chief manufactures in its district, so that our children may be specially educated for our different branches of commerce; and, judging from my own experience, I would affirm that there is no manufacturer of any importance in this country who would refuse to give such specimens as I have described for the use of the schools in his own locality; he will himself reap the fruits of his liberality in the greatly improved class of workmen which would thus be created, and the results to the commerce of this country would be such as no man can at present estimate.

I am, sir, very faithfully yours,

JOHN. W. NUTT.

6, Bank-chambers, London, 6th July, 1855.

SIR,—Having enjoyed the opportunity of carefully studying, at repeated visits, the Trade Museum at present open in London, I venture to express, through your *Journal*, the hope that measures will be taken to render the Museum permanent, and to enlarge it, so as to embrace within its collections the other objects required to render such an institution complete.

The apartment of the Society of Arts rooms at present occupied by the Museum can only, of course, from its comparative smallness and darkness, imperfectly display the number and variety of objects collected to illustrate

the animal department of a Trade Museum. But the admirable way in which they are arranged, and the courtesy of Professor Solly and his assistants, enable even a hasty visitor to appreciate the value of the collection already made, and the importance of preserving it as the nucleus of a much larger similar collection, fitted adequately to represent the extent to which trade and manufacture are dependent on the animal kingdom as a source of marketable products and plant raw material.

For my own part, having studied the contents of the Museum with considerable minuteness and care, and having for some years past come much in contact with young men training for professions in which the application of physical science to the useful arts is a matter of paramount importance, I would value very highly the existence of such a collection as I saw at the Adelphi as a means of instruction for those students.

A complete Trade Museum, representing with tolerable fullness, the animal, vegetable, and mineral departments of an economic institute, would, of course, be still more valuable as a school of practical science. The sons of our manufacturers, tradesmen, farmers, country gentlemen, and others who proposed to follow the professions of their fathers, or to go abroad, and the officers of our army and navy, and of the East India Company's service, who can so largely contribute to open up the wealth of our Colonies, have hitherto had to pick up imperfectly in many quarters, and with much waste of time, labour, and money, information which a comparatively brief study of the contents of a well-arranged Trade Museum would much more completely and easily furnish. It would be a great satisfaction, accordingly, to all here interested in economic science, to be assured that the views which have led to the present exhibition of the nucleus of the animal department of a Trade Museum, will be carried out so as to secure the permanent establishment of such a museum in all its departments.

Allow me to add, that I was specially pleased to find that the historical element has not been neglected in the animal collection. Objects of merely antiquarian value would be out of place in such a museum, but illustrations of the progress of manufacture and invention, marking the great changes which have occurred in important processes, are essential to prevent ingenious men wasting their time in unprofitable re-inventions and re-discoveries.

Yours very truly,

GEORGE WILSON, M.D.,

Director of the Industrial Museum of Scotland.

Elm Cottage, Edinburgh, July 7th, 1855.

WROUGHT-IRON ORDNANCE.

SIR,—It is an undoubted fact that cast-iron ordnance will wear out and become unserviceable after a certain number of shot have been discharged, owing to the irregular enlargement and scoring of the bore, and this effect will take place more or less rapidly, whatever may be the material of which the gun may be constructed.

The rapid discharge and skilful aim of modern gunners, unknown to our fathers, renders this destruction far more prominent in our time. As soon as the bore of a gun becomes so much deteriorated as to render the aim uncertain, it will be thrown aside as useless by the artilleryman of the present day, or his reputation as a marksman would be endangered; and more than all, be it observed, that though science has marched of late with giant stride, the material of both gun and shot has remained identically the same for centuries.

This destruction is accelerated by the unfortunate circumstance that the shot or shell acquires an extremely hard crust or "*chill*" by being cast in iron moulds, while the bore of the gun, drilled out of the solid, presents internally a surface of soft cast-iron. The introduction of wrought-iron guns, though possessing the great advantage of strength and lightness combined, will increase the rapidity of destruction, unless such wrought-iron guns

shall be lined with steel throughout the bore. But the most economical and ready mode of producing light ordnance equal to the wear and tear of modern warfare, will be found to be that recommended by me in my communication inserted in your *Journal*, No. 108, page 78.

So superior is steel to iron, that it has been found necessary to construct the working parts of locomotive engines of steel only, as soft iron is wholly inadequate to withstand such violent and rapid motion.

The passing of heavy shot through the bore of a gun is a parallel case.

A CIVIL ENGINEER.

Poole, July.

MORTARS, CANNON, AND SIR HOWARD DOUGLAS.

Sir Howard Douglas, in his discussion in the *Times* of the question of horizontal and vertical fire, unquestionably has reason with him in preferring the latter, as more destructive, quoad the present means of resistance, *i.e.*, the ramparts of earth erected to resist horizontal fire are superior, with regard to their object, to the defences against vertical fire; but it would be a practicable thing, first of all, to build a whole town of what are called bomb-proofs in stone, and then to cover them with such a "Pelion on Ossa" of earth as to preclude the possibility of any weight piercing through them; that is to say, artificial caverns might be constructed as safe against vertical attack as a deep coal-mine, and as unpleasant to live in,—probably so unhealthy as to defeat the object of defence. "Better is it to hear the lark sing than the mouse cheep," and so far the water janitors in the free air would have the advantage of the cavern dwellers.

In the matter of mortars *versus* guns, Sir Howard Douglas seems to lose sight of the philosophy of the question. He takes it for granted that all the instruments for vertical fire, or rather for throwing shells into the air at an angle of 45 degrees, to drop vertically, must be mortars, because they always have been so; that long guns are fitted for horizontal fire, and short guns, or mortars, for vertical. Let us inquire into this.

Given the diameter of a bore and the weight of powder: it is obvious that there is a proportionate length of bore requisite to produce the maximum effect on the projectile with the expansion of the gases generated. If the bore be too short, the projectile will be thrown out with diminished force, and power will be wasted upon the external atmosphere; if too long, power will be wasted in frictional resistance to the projectile by the surplus length. The maximum result must be obtained by confining the generated gases just long enough, and not too long.

Apart from the economical consumption of power, the length of the bore gives also directing power. So well is this understood by Yankee riflemen and Eastern gunners, that the one country is known by the long rifle, and the other by long cannon, of which many samples have been brought to England.

If a long cannon be better than a carronade, *i.e.* a short cannon—for long shots horizontally, *i.e.*, for a flat parabolic curve, it must be better for what is called vertical fire, *i.e.* a very sharp parabolic curve.

It is quite true that a heavy gun, suffered to recoil, may damage a ship's side, but so might a heavy mortar. If the gun were placed in the position of the mortar, with a sufficiently broad bearing, distributed over a mass of heavy ballast low in the vessel, the effect would be the same as the mortar, proportioned to the force of the powder, and the inertia of the gun, by reason of its weight.

It follows, therefore, that the greater the range of the gun the greater may be the distance of the vessel from the fortress attacked, so as to be out of reach of attack by boats, an advantage of considerable importance, and the greater will be the height from which the shell will fall.

It is clear that the mischievous effect of the shell will be in proportion to the height from which it falls, up to a certain point, *viz.*, the maximum of accelerating velocity, the positive weight, and the power of the explosive compound with which it is charged.

The projectile force of the powder in the gun will be in proportion to the resistance of inertia in the gun.

Cast iron is not a good material; it is highly elastic, and being also brittle it becomes crushed internally by the blows of the large mass of powder, just as the metal is crushed in a Bramah's press of great power; and, therefore, to attain the maximum effect we must come to wrought iron, the more especially that the larger the iron casting the more inferior is the metal.

How to construct a wrought iron gun of 26 inches bore, and 26 feet in length, to fix it in a corresponding bed plate at an angle of 45 degrees, and to arrange the mechanism needful to charge it, with little human labour; how to preserve its bore polished, and to replace its vents when worn, preserving the gun from injury as a woodman does his rifle; and how to keep it cool in use—is the problem set before us to solve. The weight is no detriment in a steam fleet, but an important element in neutralising recoil. It is not a very difficult problem, if rightly set about.

The increased size in the guns of war-ships has made them more difficult to handle; it takes 15 men to work and fight a great gun, to run it in and out, and remain exposed to the enemy's small arms while charging it. If recoil be prevented, and breech-loading adopted, horizontal fire may go on with closed ports, and three or four men to a gun will suffice. For vertical fire, the gun would be a fixture, and some fewer men would suffice. The steam power could place the vessel in position requisite for the range and aim. The steam power could also be used in conjunction with an air cylinder to repel boarders by a shower of shot.

The aim and object of war is to disable your enemy, while out of his range. It is obvious that horizontal fire must give a greater range than vertical fire with a weapon of a given power, and that the only way to increase the range of the vertical fire is by increasing the size of the projector.

We do not well understand what Sir Howard Douglas means by saying:—"It may be doubted whether at any time fuses can withstand the shock of the charge which must be used in firing executive shells from a distance of 5,000 or 6,000 yards." Does he mean that our mortars are at their maximum? Surely the fuse can be attached to springs to reduce the concussion. But if it is "doubted" why not try it? Why not fire a cannon vertically up and down, to try conclusions, and measure the time of the descent of the shell.

Why do we call the Russian water-mines infernal machines? They seem very harmless so far, as are most mines. The American torpedo was the first of this class, but required fixing like a petard to the ship's bottom, a problem difficult of solution; much more so than that of the winged mines that will yet rive out the heart of Cronstadt, and wither into impotence the brute despots who call men serfs, and expend them with as little remorse as they do heads of cattle.

It is not by taking things for granted on bygone knowledge that the new and essential can be attained. It is by practical experiments based on philosophical induction, that this question of the maximum range and power of missiles must be worked out, so as to deposit the largest integral power of explosive compound within the enemy's fortress at each successive discharge. We may not attain the fabled result of the long thin Dover gun, called Queen Elizabeth's pocket pistol, but we are assuredly still very far from the possible. In our arsenal at Woolwich it would be possible to solve the problem, with much more useful results than the rifle experiments at Manchester, and surely a man like Sir Howard Douglas would be com-

petent to take the matter in hand, using the bygone only as a fulcrum for the future.

COSMOS.

July 9th, 1855.

SUGAR MANUFACTURE.

SIR,—I address you with a twofold object; firstly, to give a short account of improvements in sugar mills, manufacture, &c.; secondly, to try and receive through your columns information relative to the growth of sugar up the Nile. Sugar mill rollers were formerly made to revolve from 5 to 7 revolutions in a minute. Now it is found that three or four revolutions allow the cane-juice to drop away more clearly and fully, and that the megass, or refuse cane, is consequently so much more easily dried, and becomes better fuel. Such colonies as Trinidad and Demerara have long suffered from want of proper fuel. W. Burnley Hume, Esq., (second son of the deceased M.P.), informs me that cane, which was underground drained in 1845-6-7, is now giving a most unparalleled return of fine sugar. He is also an advocate for good high chimnies at sugar works, and railways for the colonies. No fairer field presents itself to intelligent sober engineers, than the colonies of Demerara and Trinidad for the erection of saw mills.

Can you kindly give me any information relative to the growth of sugar up the Valley of the Nile. I fear to trespass further on your valuable space.

Yours, &c.,

MACKENZIE DICK.

23, Newman-street, London, June, 1855.

P.S.—Having acted as one of two judges at the first ploughing match ever held in the fine island of Trinidad, in 1846, I feel an interest in the welfare of the colony, which is comparatively in a virgin state, abounding in fine timber and rich lands. Certainly, the Americans are more apt to run up light saw mills (water or steam) than the Britishers. Something in the shape of Dr. Arnott's ventilators would, I think, be of use in evaporating chambers, both at home and abroad—of course on a large scale.

CATALOGUE OF BOOKS FOR MECHANICS' INSTITUTIONS.

SIR,—Be so good as to correct, in the next number of the *Journal*, a statement attributed to me in the Report of the Meeting of Representatives at the Conference last week.

I am made to state that, for the purpose of getting a list of books for institutions, I had gone to the catalogue of the London Mechanics' Institution. This is obviously a mistake, and will be best corrected by stating what I have done. The Yorkshire Union published some years ago a priced catalogue of a few hundred works, as an aid to Mechanics' Institutions in the selection of books. This has been out of print for some years, and more than a year since the committee requested me to revise it, with a view to its re-publication. I found, however, that a hasty process of curtailment and addition would be very unsatisfactory, and I therefore decided to go over the *London priced lists* of books published during the last thirty years. This, though done cursorily, has at least brought under review the great accessions made in recent years to the literature suitable for popular institutions, and I have selected pretty liberally, so that I apprehend the committees (of all but the largest institutions) may, for a few years to come, be enabled to form from this catalogue, collections of works in every class, and distinguished by ample variety of treatment. And as the published prices will be attached to the works, an exact estimate may be made of what can be effected with a given sum appropriated to the purchase of books.

As regards theological books, the catalogue of which mine may be considered a new and enlarged edition, contained a section of these of standard character, and I have retained this section and made such additions to it as

appeared to me to be absolutely necessary to preserve its integrity.

I should add, that we propose to embody a new manual for Literary and Mechanics' Institutions with the catalogue, and a variety of practical information and suggestions relative to the selection and purchase of books.

I am, sir, yours truly,

W. H. J. TRAICE.

Leeds, July 11th, 1855.

To Correspondents.

Mr. Alfred Coleman, of Wandsworth, writes, that in the report of the Conference of the 2nd inst., he is made to say, upon the subject of rating, "That they ought to go to Parliament, at all events, to clear up the difficulty in which they were in, &c." These, he adds, were the remarks of some other representative, his own opinion being that any such step would, at the present time, be very injudicious.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 28th June, 1855.

Par. No.

- 65 (5). Trade and Navigation—Monthly Accounts.
- 314. Port Wine Adulteration (Jerupiga)—Correspondence, &c.
- 341. Education (Scotland) Bill—Correspondence.
- 186. Bills—Dwellings for Labouring Classes (Ireland) (Amended).
- 194. Bills—Leases and Sales of Settled Estates.
- 195. Bills—Duchy of Lancaster Lands.
- 196. Bills—Bills of Exchange and Promissory Notes (as Amended by the Select Committee and in Committee).
- 200. Bills—Endowed Schools (Ireland).
- Factories—Reports of the Inspectors for the half-year ending 30th April, 1855.

Delivered on 29th June, 1855.

- 320. Constabulary, &c. (Ireland)—Returns.
- 322. Harbour of Refuge (Ireland)—Copy of Memorial.
- 334. Gold and Silver Watch Cases—Return.
- 340. Houses (Public Service)—Account.
- 342. Carriages, &c.—Return.
- 198. Bills—Charitable Trusts.
- 202. Bills—Copyhold, &c., Commission Continuance.
- South Staffordshire Railway—Report upon collision of the 21st May, 1855.

Delivered on 30th June and 2nd July, 1855.

- 337. Highland Roads and Bridges—41st Report of the Commissioners.
- 325. East India Revenues—Return.
- 343. Agricultural Statistics—Report of the Highland Society.
- 355. Colonial Lights—Copy of Correspondence.
- 204. Bills—Burial of Poor Persons.
- 205. Bills—West Indies Relief Loan Arrangement.
- 209. Bills—Ecclesiastical Jurisdiction Continuance.
- The River Tyne—Plans.

Delivered on 3rd July, 1855.

- 332. Coroner's Inquests (Ireland)—Abstract of Return.
- 344. Army in the East (Applications of Officers for the Loss of Horses, &c.)—Return.
- 347. Westminster New Bridge—Copy of Report.
- 348. Battersea Park and Chelsea Bridge—Copy of Report.
- 349. Metropolitan Buildings Bill—Proceedings of the Select Committee.

- 199. Bills—Medical Profession.
- 206. Bills—Excise Duties (Amended).

Delivered on 4th July, 1855.

- 357. Civil List Pensions—List.
- 201. Bills—Bleaching, &c., Works.
- 207. Bills—Lunatic Asylums and Regulations Acts Amendment.
- 210. Bills—Union of Contiguous Benefices.
- 212. Bills—Partnership Amendment (Amended).
- 213. Bills—Limited Liability (Amended).
- National Education (Ireland)—21st Report of the Commissioners, Vol. 1.

Delivered on 5th July, 1855.

- 211. Bills—Education (Scotland) (Amended).
- 214. Bills—Cinque Ports (as Amended by the Lords).
- 215. Bills—Weights and Measures (as Amended by the Lords).
- 216—Bills—Gold Wedding Rings.
- Great Western Railway—Caledonian Railway—Two Reports on Explosion of Boilers.
- South Staffordshire Railway—Report upon an Accident of the 23rd December.

Delivered on 6th July, 1855.

- 351. Roman Catholic Prisoners—Return.
- 353. Militia (Number of Volunteers)—Return.
- 354. Militia (Number of Officers, Privates, &c.)—Return.
- 356. Army School Regulations (Madras)—Return.
- 359. Assay Offices (Exeter, &c.)—Copy of Minutes and Papers.

217. Bills—Militia Officers Qualification.
 218. Bills—Mortmain (Amended).
 219. Bills—Coal Mines Inspection (as Amended in Committee, and on Re-commitment.)
 220. Bills—Dissenters Marriages (as Amended in Committee, and on Re-commitment).
 222. Bills—Treasurers of Counties (Ireland).
 223. Bills—Sale of Spirits (Ireland).
 244. Bills—Commons Inclosure (No. 2).
 Public General Acts—Cap. 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, and 44.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, June 29th, 1855.]

Dated 18th June, 1855.

1392. J. Jones, Sheffield—Motive power.
 1393. J. H. Johnson, 47, Lincoln's-inn-fields—Furnaces. (A communication.)

Dated 19th June, 1855.

1394. C. A. Hartmann, Paris—Colours for fabrics.
 1396. E. Dixon and T. Bailey, Wolverhampton—Tap.
 1398. J. Macintosh, Great Ormond-street—Fuses.
 1400. J. Letchford, Duncan-place, Hackney—Folding bedstead.
 1402. J. H. Johnson, 47, Lincoln's-inn-fields—Storing grain. (A communication.)

Dated 20th June, 1855.

1404. D. B. Hertz, 17, Cornhill—Life-preserving harness. (A communication.)
 1406. R. B. Longridge, Manchester—Boilers and tubes.
 1408. J. Gernon, 14, Buckingham street, Adelphi—Articles of clay. (A communication.)
 1410. R. Walker and A. Mc Kenzie, Glasgow—Electric telegraphs.
 1412. R. W. Savage, St. James's square—Swing doors.
 1414. E. Cochand, Paris—Aerated liquids.
 1416. W. E. Newton, 66, Chancery-lane—Finishing thread. (A communication.)

[From Gazette July 6th, 1855.]

Dated 17th May, 1855.

1119. W. Smith, 10, Salisbury-street, Adelphi—Machine for cleaning cotton. (A communication.)

Dated 7th June, 1855.

1293. P. A. Favre, Marseilles—Employment of residue arising from lixiviation of crude sodas.

Dated 9th June, 1855.

1318. C. F. Varley, 1, Charles-street, Somers-town—Electric telegraphs.

Dated 16th June, 1855.

1376. J. Lowe, East Greenwich—Propelling vessels.

Dated 19th June, 1855.

1395. J. F. Norton, Manchester—Measuring liquids. (A communication.)
 1397. F. Burke, Montserrat, W. Indies—Paper material.
 1399. D. Gover, King-street, Long-acre—Gun carriages.
 1401. J. H. Johnson, 47, Lincoln's-inn-fields—Emptying cesspools. (A communication.)
 1403. J. H. Johnson, 47, Lincoln's-inn-fields—Dish covers, &c. (A communication.)

Dated 20th June, 1855.

1409. J. Gernon, 14, Buckingham-street, Adelphi—Plaster of Paris and cement. (A communication.)
 1413. U. Lane, Brighton—Pumps.
 1415. L. Pol, Paris—Pianofortes.
 1417. T. F. V. Fabien, Paris—Wheels. (A communication.)

Dated 21st June, 1855.

1418. J. L. Jullion, Tovel—Paper, card, and millboard.
 1419. W. C. Wilkins, Long-acre—Lamps.
 1420. P. F. Rioux, Paris, and L. de Pariente, Schaerbeck, next Brussels—Fixing metallic ornaments upon fabrics. (A communication.)
 1421. M. Shelley, 12, Union-crescent, Kingsland-road—Cooking utensils.
 1422. J. R. Birch, Liverpool—Boat plug.
 1423. J. Benjamin, Leadenhall street—Gas. (A communication.)
 1424. T. Bongereau, 46, Lime-street—Roasting coffee.
 1425. R. Keevil, Lacock, Chippenham—Vessels used in manufacture of cheese.

1426. W. Basché, 2, Mayfield-place, Kensington—Paper.
 1427. C. E. Green, 13, Blandford-street, Portman-square—Huts, tents, and camp hospitals.

1428. L. Young, Bow-lane, Cheapside—Gas regulators.
 1429. T. C. W. Pierce, Manchester—Machinery for finishing yarns.
 1430. A. E. L. Bellford, 32, Essex-street, Strand—Steam engines. (A communication.)

Dated 22nd June, 1855.

1432. O. R. Chase, Boston, U.S.—Machine for making lozenges.
 1434. S. White, Liverpool—Washing, cleansing, and drying grain.
 1436. A. E. L. Bellford, 32, Essex-street, Strand—Breech-loading fire-arms and cartridges. (A communication.)
 1438. J. G. N. Alleyne and H. Stafford, Alfreton—Railway brakes.

Dated 23rd June, 1855.

1440. S. T. M. Sorel, Paris—Applying adhesive matters on stuffs.

1442. F. W. Mowbray, Shapley, near Leeds—Looms.

1446. A. E. L. Bellford, 32, Essex-street, Strand—Bats for felting. (A communication.)

Dated 25th June, 1855.

1448. J. Young, Linton, Roxburghshire—Harrow.
 1450. J. Page, Perth—Moulding metals.
 1452. M. Poole, Avenue-road, Regent's-park—Sculpturing surfaces of marble and stone. (A communication.)

Dated 26th June, 1855.

1454. A. E. L. Bellford, 32, Essex-street, Strand—Rotary blowing machines. (A communication.)
 1456. F. Leiss and C. Schneider, Hesse Darmstadt—Mica letters, figures, &c.
 1458. M. Poole, Avenue-road, Regent's-park—Printing rollers. (A communication.)
 1460. F. Venin-Derégnaux, Lille—Spinning machinery.
 1462. J. J. Bucknall, Liverpool—Hats and caps.
 1464. J. M. Clements, Birmingham—Spring lock fastening for pockets, &c.

WEEKLY LIST OF PATENTS SEALED.

Sealed June 26th, 1855.

835. Edward Hammond Bontall, Heybridge—Improvement in the construction of harrows.
 837. George Beard, Birmingham—Improved label and stamp setter.
 854. Richard Bridge, Chadderton—Improvements in power looms.
 871. Peter Lear, Boston, U.S.—Improved method of arranging and operating horizontal submerged propellers.
 879. William Ryder, Bolton-le-Moors—Improvements in certain parts of machinery for slubbing and roving cotton and other fibrous substances.
 890. Edwin Pettitt, Manchester—Improvements in preparing and spinning cotton and other fibrous substances, and in machinery for such purposes.
 891. William Gerhardt, Manchester—Improvements in apparatus to prevent the lapping of straps round shafts.
 896. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the consumption or prevention of smoke. (A communication.)
 897. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in machinery or apparatus for spinning cotton and other fibrous materials. (A communication.)
 903. Joseph Whitworth, Manchester—Improvements in ordnance, fire-arms, projectiles, and machinery for the manufacture thereof.
 916. Matthew Andrew Muir, Glasgow—Improvements in the manufacture or moulding of railway chairs.
 920. William Symington, Little Bowden, Northampton—Improvement in preparing peas and pearl and Scotch barley for culinary purposes.
 923. James Wallace, jun., Glasgow—Improvements in bleaching, washing, or cleansing textile fabrics and materials.
 947. Thomas Haley Burley, Ohio, U.S.—Machine for making dovetails.

Sealed June 29th, 1855.

2746. Andrew Dietz and John G. Dunham, Raritan, New Jersey—Improvements in mowing and reaping machines, by which the sickle cutting the grain is moved or worked directly by the driving wheel, or its equivalent, without the necessity of cog-wheels, cranks, &c.
 16. William Kendall and George Gent, Salford, near Manchester—Improvements in machinery or apparatus for cutting metals, either solid or tubular.
 25. George Walker Muir, Glasgow—Improvements in warming and ventilating.
 28. George Bowden, 1, Little Queen-street, High Holborn—Improvements in the manufacture of united adhesive book-headband and register ribbons.
 64. Edward Booth, Gorton—Improvements in the mode and machinery for dressing, starching, and finishing textile and other fabrics and materials.
 83. François Victor Guyard, Gravelines—Improvements in the electro telegraphic communications.
 94. John Graham, Hartshead Print Works, near Stalybridge—Improvements in fixing certain colors in or upon yarns and textile fabrics.
 121. Ambroise Quertinier, Charleroi—Improvement in glass furnaces.
 142. Charles Frederick Stansbury, 17, Cornhill—Improvements in the construction and operation of self-acting railway breaks. (A communication.)
 161. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the construction of seats and similar articles of furniture. (A communication.)
 164. Henry Carr, Peterborough—Improvements in railway crossings.
 192. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in machinery or apparatus for preparing cotton and similar fibrous materials. (A communication.)
 294. Alfred Vincent Newton, 66, Chancery-lane—Improved construction of spur.
 490. Richard Van Valkenburgh De Guinon, Brooklyn, New York—Improvements in anchors.
 794. Charles Blunt, Wansstead, and Joseph John William Watson, Wandsworth—Improvements in the composition of artificial fuel, with the machinery employed in the manufacture thereof.

906. Alfred Jenkin, Zell on the Moselle—Improvements in furnaces for the reduction and calcination of lead and copper ores.
911. William Westley Richards, Birmingham—Improvements in repeating or revolving fire-arms.
912. Josiah Horsfall, Manchester—Machinery for mitreing moulded and other esashes.
984. Frederick William Harrold, Birmingham—Improvements in the manufacture of the frames of slates used for writing on.
987. Thomas Ridgway Bridson, Bolton-le-Moors—Improvements in preparing, beetling, or finishing textile fabrics.
1010. James Pearson, Pyle House, Totterdown, Bedminster, near Bristol—Improvements in the method of fastening tyres on wheels.
- Scaled July 3rd, 1855.*
27. Louis Jacques Martin, Paris—Improvements in the composition of colours for printing and dyeing, and in the application of such colours.
29. William Henry Bulmer, Queen's-head, near Halifax, and William Bailey, Halifax—Improvements in machinery or apparatus for combing wool, cotton, and other fibrous substances.
32. John Livesey, 20, Kensington-gore—Improvements in printing and in the materials and apparatus connected therewith.
34. Benjamin Cook, Green-street, Birmingham—Improved apparatus for separating filings of iron or steel from other metallic filings.
45. Robert McCall, Pallas-Kenry, Limerick—Improvements in the manufacture of iron and steel.
53. Joseph Offord, Wells-street, Oxford-street—Improvements in the construction of carriages.
54. André Gaspard Guesdon, Paris—A furniture table which may be used for different purposes.
56. Nathaniel Jones Amies, Manchester—Improvements in winding or balling thread or yarn, and in the machinery or apparatus connected therewith.
76. James Wood, 30, Barbican, London—An improved process for lettering and ornamenting glass, which the inventor terms Hyalotypy.
115. Jonathan Saunders, St. John's-wood—Improvement in the manufacture of axles and shafting.
189. Charles Frederick Burnard, Plymouth—Improvements in the manufacture of superphosphate of lime.
216. Henri Louis Dormoy, Paris—Improvements in braiding or plating machinery.
217. John Doddridge Humphreys, 20, Charlotte-street, Caledonian-road—Improvements in steam engines.
227. David Moline, Adelaide-place—Improvements in the manufacture of metallic window frames and skylights.
437. James Higgin, Manchester—Improvements in treating certain waste soap liquors and obtaining therefrom certain products applicable to purposes not hitherto known.
671. John Marland, Leeds—Improvements in preparing for and in sizing and warping woollen and worsted yarn.
763. Joseph Edwin Frost, 135, Goswell-street—Improvement in ball or float cocks.
843. George Fergusson Wilson, Belmont, Vauxhall, and Warren De la Rue, Bunhill-row—Improvements in combining fluids to be burned in lamps.
857. William Madeley and Thomas Hanlon, Manchester—Improvement in or applicable to power looms.
884. Samuel Cunliffe Lister, Bradford—Improvements in treating rheum plant, so as better to prepare its fibres before being spun.
946. William Shears, Bankside, Southwark—Improvement in cases or magazines for gunpowder or other explosive preparations or compounds.
954. Morris Lyons, Suffolk-street, Birmingham—Improved enamel for coating metals and bricks.
961. Alfred Vincent Newton, 66, Chancery-lane—Improvement in file-cutting machinery.
962. William Elliot Carrett, Sun Foundry, Leeds—Improvements in motive power engines.
1066. David Caddick, Ebbw Vale Iron Works, Monmouth—Improvements in puddling furnaces.
106. Richard Peters, 89, Union-street, Borough—Improvements in steam engines.
- Scaled July 6th, 1855.*
62. Bartholomew Predaval, 106, Great Russell-street, Bedford-square—Improving the production and manufacture of pulp for the making of paper.
68. Louis Pierre Leheugur and Michel Uttinger, St. Denis, near Paris—Improvements applicable to machinery for printing fabrics.
123. David Davidson, Meiklewood by Stirling—Improved apparatus for pointing ordnance, and restoring the aim of the piece either by day or night when it is once obtained.
143. Stanislaus Joseph Paris, Manchester—Improvements in machinery for embossing.
146. Peter Armand le Comte de Fontaine Moreau, 4 South-street, Finsbury—Improvements in obtaining electro-motive power.
172. John Coates, Salford—Improvements in railways.
178. Richard Laming, Carlton-villas, Maida-vale—Improvements in obtaining and combining ammonia.
200. Joseph Leese, junior, Manchester—Improvements in the process of printing calicoes and other textile fabrics.
205. Robert Mallet, Dublin—Improvements in the manufacture of hollow shot and shells, and similar hollow bodies of cast iron or other cast metals.
236. George Price, Wolverhampton—Improvements in iron safes, chests, and boxes.
271. Joseph Gibbons, 345, Oxford street—Improvement in fixing the spindles of door locks to their knobs.
335. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in governors or regulators for steam engines or other prime movers. (A communication.)
480. Charles Iles, Peel Works, Birmingham—Improvements in apparatus for cutting, burnishing, and polishing cylindrical surfaces of metal and other substances.
481. Charles Iles, Peel Works, Birmingham—Improvements in the manufacture of tubes, knobs, and handles of doors, rollers of castors, and reels for cotton and thread.
539. William Smith, 10, Salisbury-street, Adelphi—Safety harness.
732. Charles Crews, 8, Montague-terrace, Bow-rad, and Henry George Gray, St. James's-street—Improvements in preparing and using deodorizing or disinfecting compounds.
824. Jules Denoual, Samares lodge, St. Clements, Jersey—Improved means of enveloping medicinal preparations with soluble substances.
868. Alfred Vincent Newton, 66, Chancery-lane—Improved machinery for crushing and grinding mineral and other substances.
870. William Jones, Rhodes, near Middleton—Improvements in printing calico and other fabrics.
907. Alfred Vincent Newton, 66, Chancery-lane—Improved machinery for separating substances of different specific gravity.
908. William Gossage, Widnes—Improvements in the manufacture of certain kinds of soap.
917. Charles Piazzi Smyth, 1, Hillside-crescent, Edinburgh—Improvements in astronomical and geodetical instruments.
970. William Banks, Henry Hampson, and John Banks, Bolton-le-Moors—Improvements in machinery or apparatus for bleaching yarns or thread, either in the cop or hank.
1009. Robert Broadbent, Stalybridge, and Squire Farron and Benjamin Grundy, Ashton—Improvements in steam engines.
1014. Ebenezer Tyzack, Abbey Dale Works, Sheffield—Improvement in scythes.
- Scaled July 10th, 1855.*
63. William Thomas Henley, St. John street-road—Improvements in steam boilers or generators, and in apparatus in connexion therewith.
93. William Henry Nevill, Llanelly—Improvements in the construction of reverberatory furnaces for the collection and condensation of volatile substances.
98. Edward Lambert Hayward, Blackfriars road—Improvements in kitchen ranges.
106. George Riley, 12, Portland-place-north, Clapham road—Improved false bottom for brewers', distillers', and vinegar-makers' mash tubs.
107. Edward Haynes, jun., Bromley—A smoke-consuming furnace.
424. William Armand Gilbee, 4, South-street, Finsbury—Improved soap, to which he gives the name of saponitoine.
1041. John Mayo Worrall, Salford—Improvements in machinery or apparatus for cutting piled goods or fabrics.
1042. John Mayo Worrall, Salford—Improvements in machinery or apparatus for cutting piled goods or fabrics.
1047. Cullen Whipple, United States—Preparing and combing wool.
1048. Samuel Grainicher, Zofingen, Switzerland—Improvements in the construction of pumps, parts of which improvements are also applicable to steam-engines. (A communication.)
1057. John Harris, Woodside, near Darlington, and Thomas Summerson, West Auckland, near Darlington—Improvement in the manufacture of iron railway wheels.
1062. John Henry Johnson, 47, Lincoln's-inn-fields—Improvements in the manufacture of sulphuric acid. (A communication.)
1072. William Bridges Adams, 1, Adam-street, Adelphi—Improvements in the construction and propulsion of vessels for navigation moved by internal power.
1090. Alexander Robertson, Sheffield—Improvements in the construction of stoves and fire grates.
1092. Alfred Charles Garratt, Massachusetts—Facilitating the work of lubricating the axles or bearings of carriage wheels.
1095. George Tomlinson Bousfield, 8, Sussex-place, Loughborough-road, Brixton—Improvement in burning hydrocarbons in lamps.
1150. Alfred Vincent Newton, 66, Chancery-lane—Improvements in the construction of watches.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3734	July 9.	{ An Improved Valve for regulating the pressure of Steam from Steam Boilers	Abbott and Forrest	Blackburn. Lancashire.